Patent Number	5115671
Issue Year	92
Assignee Code	336995
State / Country	OH
Status	A vibration transducer (22) is mounted to a rotating machine (20) for sensing vibration thereof. An output electrical signal from the vibration transducer is analyzed to generate a level display (18) of vibrational displacement per unit time, a speed display (22) indicative of rotational speed, and a bearing condition display (20) indicative of bearing condition, all displays derived directly from the vibration transducer signal. The electrical signal is transformed (36) into a <u>frequency</u> spectrum that has an amplitude for each of a plurality of narrow <u>frequency</u> ranges or bins. Each <u>frequency</u> <u>bin</u> has a characteristic center <u>frequency</u> and a predefined width or band of frequencies. A speed analysis program (38) identifies a set of at least first, second and third order related <u>frequency</u> bins, i.e. <u>frequency</u> bins whose center frequencies are an even multiple of each other, that have a significantly high amplitude and provides the lowest <u>bin</u> center <u>frequency</u> as a control signal to the speed display. A bearing condition analysis program (40) eliminates the bins that are integer multiples of the running speed and lower <u>frequency</u>, e.g. less than third order, identifies sets of bins with relatively large amplitudes that are integer multiples of each other, and selects the set of bins with the largest amplitude as being controlling of bearing condition. After elimination of frequencies not indicative of bearing condition, the bearing defect <u>frequency</u> remains. The amplitude of this <u>frequency</u> is displayed on bearing condition readout (22). The amplitude indicating the severity of the bearing defect.73/488 73/660
Title	Method and apparatus for analyzing rotating machines

Patent Number	5109700
Issue Year	92
Assignee Code	336995
State / Country	OH
Status	

A vibration transducer (22) is mounted to a rotating machine (20) for sensing vibration thereof. An output electrical signal from the vibration transducer is analyzed to generate a level display (18) of vibrational displacement per unit time, a speed display (22) indicative of rotational speed, and a bearing condition display (20) indicative of bearing condition, all displays derived directly from the vibration transducer signal. The electrical signal is transformed (36) into a _frequency_ spectrum that has an amplitude for each of a plurality of narrow _frequency_ ranges or bins. Each _frequency_ _bin_ has a characteristic center _frequency_ and a predefined width or band of frequencies. A speed analysis program (38) identifies a set of at least first, second and third order related _frequency_ bins, i.e. _frequency_ bins whose center frequencies are an even multiple of each other, that have a significantly high amplitude and provides the lowest _bin_ center _frequency_ as a control signal to the speed display. A bearing condition analysis program (40) eliminates the bins that are integer multiples of the running speed and lower _frequency_, e.g. less than third order, identifies sets of bins with relatively large amplitudes that are integer multiples of each other, and selects the set of bins with the largest amplitude as being controlling of bearing condition. After elimination of frequencies not indicative of bearing condition, the bearing defect _frequency_ remains. The amplitude of this _frequency_ is displayed on bearing condition readout (22). The amplitude indicating the severity of the bearing defect.73/660 73/602

Title	Method and apparatus for analyzing rotating machines

Patent Number 5077700
Issue Year 91
Assignee Code 597270
State / Country PA
Status

The velocity of a vessel is determined in real time by
a doppler sonar sym providing acoustic beams wherein
received beams provide a plurality of bins or returns
from various depth segments. The frequency shift with
respect to at least two different bins is determined.
The velocity of the vessel with respect to each bin is
determined according to the phase shift of the
respective bin. The vessel velocity is determined as
an average of the determined velocities of the bins
along the acoustic beam. The acoustic beams are paired
to form beam pairs wherein each bin in one beam of the
beam pair has a corresponding bin in the other beam of
the beam pair. The phase shifts of the corresponding
bins are used to determine a relative frequency shift
for the corresponding bins. This determination is made
along the length of the beams of the beam pair and
averaged. The averaged resolved ship doppler profiler
velocity when compared to inertial velocities
determines water current velocities. When the bin
averaged doppler velocities are compared to a sliding
average of the water current velocities accurate
reference velocities are output in real time for
inertial navigation system velocity damping. In
addition the real time depth change of a ship can be
measured by integrating the summed vertical velocity.
367/91 367/90

Title DOPPLER VELOCITY PROFILER

Patent Number	5065322
Issue Year	91
Assignee Code	589445
State / Country	MI
Status	

A method and apparatus is disclosed for controlling actuation of a passenger restraint system in a vehicle. The apparatus includes an accelerometer for providing a time domain vibratory electric signal having frequency components indicative of a vehicle crash condition. An A/D converter converts the accelerometer signal into a digitized signal. A fast Fourier transform device transforms the digitized time domain vibratory electric signal over at least two time intervals into frequency domain signals. The amplitudes of corresponding frequency bins of the frequency domain signals are summed over the entire frequency spectrum, bin-to-bin. A microcomputer monitors the sum of the amplitudes of at least one selected frequency bin of the frequency domain signals and actuates the passenger restraint system when the sum is greater than a predetermined threshold thereby indicating a particular type of vehicle crash is occurring.364/424.05 180/282 280/735 340/429 364/424.01 364/726

Title
METHOD AND APPARATUS FOR SENSING A VEHICLE CRASH IN REAL TIME USING A FREQUENCY DOMAIN SUMMATION ALGORITHM

Patent Number	5056051
Issue Year	91
Assignee Code	563975
State / Country	CA
Status	

The present invention is an improved direction finding (DF) processing system using digitally implemented spectral analysis. Both phase and amplitude responses are calibrated by comparing each spectrum "bin", or portion of the frequency bandwidth, to the other receiver or receivers output. A random noise source is used, with a large number of noise waveforms being measured and averaged. The average responses are then compared. The difference for each spectrum bin is stored in a passband calibration table. When the direction of origin of a signal of interest is later calculated using the difference in spectra for each bin, the value in the calibration table is first subtracted out.364/571.05 340/870.04 342/165 342/174 364/571.07

Title
SIGNAL DIRECTION FINDING PROCESSOR USING FAST FOURIER TRANSFORMS FOR RECEIVER MATCHING

Patent Number	5033019
Issue Year	91
Assignee Code	480040
State / Country	CA
Status	

A <u>frequency</u>-domain Fast Fourier Transform windowing device includes a plurality of input lines, each of which is coupled to a corresponding <u>frequency</u> <u>bin</u> output line of an FFT; and a memory. The memory includes address input ports connected to the input lines and an output line. The memory reads out onto the output line values read out from the locations in the memory corresponding to signals received at the address input ports. The memory has stored in it values corresponding to the coneolution of samples on several of the input lines and the corresponding predetermined weighting coefficients.364/726 364/724.18

Title VERY-HIGH-SPEED <u>FREQUENCY</u>-DOMAIN FFT WINDOWING DEVICE

Patent Number	4990848
Issue Year	91
Assignee Code	570160
State / Country	GA
Status	

A DTF receiver (10) recognizes each of a plurality of multi-<u>frequency</u> tone s, each tone centered on a predetermined standard <u>frequency</u>. Two digital bandpass filters (14, 16) each have four <u>frequency</u> bins, each <u>frequency</u> <u>bin</u> operating according to a recursive second-order transfer function for preferentially transmitting frequencies near the standard frequencies. Each <u>frequency</u> <u>bin</u> accumulates, for each of a plurality of sampling periods, respective spectral energy signals from the input signal. A temporal energy signal is derived from the spectral energy signals. For each bandpass filter (14,16), a time-domain test template generator (30) and a <u>frequency</u>-domain test template generator (34) are provided to generate time-domain and <u>frequency</u>-domain test templates. These test templates are input to an analyzer (38) that compares the templates against data-adaptive <u>frequency</u>-domain and time-domain reference templates.364/485

Title DTMF RECEIVER

Patent Number	5212489
Issue Year	93
Assignee Code	262805
State / Country	NY
Status	Target velocity and range are measured with high resolution in an echo ranging system (sonar or radar) using composite Doppler invariant signals consisting of at least two segments, such as "rooftop" or "vee" HFM signals, such composite signals having ambiguity functions that intersect along the zero-velocity time axis with ridge lines slanted in different directions. A single correlator is used for each segment wherein returns from the target are correlated with replicas of each segment of the composite signal to separately transform the Doppler frequency shifts of the target return into outputs whose time relationship provides a frame of reference for high resolution measurement of the velocity of the target. The time relationship measurement is implemented by a set of tapped delay lines and coherent summers which output a coherent correlation-like detection peak in a bin which corresponds to the target's velocity. Thus, one correlator for each transmission segment together with a tapped delay line and summer network may be used for velocity detection, with high precision range detection, based upon the timing of the detection peak with respect to the transmitted signal, also being implemented at the same time, thereby avoiding the classical need for an expensive bank of correlators (one for each velocity bin) and yielding significant economies for the simultaneous high resolution measurement of range and velocity for a target by means of echo ranging.342/109 342/108 342/189 364/724.11 364/728.06 367/100 367/102
Title	Echo ranging system for detecting velocity of targets using composite doppler invariant transmissions